# Chapter 10 IEW SATCOM

***Contents***



***Intelligence and Electronic Warfare satellite communications systems are vitally important to winning the information war and disseminating intelligence in near real-time to tactical commanders.***

## OVERVIEW

Intelligence and Electronic Warfare (IEW) communications are critical to mission success. IEW Satellite Communications (SATCOM) systems are vitally important to winning the information war and disseminating intelligence in near real-time to tactical commanders.

The Military Intelligence (MI) mission requires the capability to rapidly deploy resources to support a force projection commander anywhere in the world against any enemy. Satellite communications are critically important in accomplishing this mission. This chapter will discuss the IEW SATCOM architecture and specific programs with which the intelligence community is involved. These IEW architectures support a variety of intelligence missions through a combination of military and commercial satellite communications and terminals acquired by various agencies and departments. The missions these architectures support have requirements for timeliness, capacity, and multi-level security. In some cases, these requirements cannot be fully supported by the area common user systems.

## IMPORTANT IEW DEFINITIONS

The following definitions are provided to assist the reader in comprehending information contained in this chapter.

Tactical Exploitation of National Capabilities (TENCAP): TENCAP is responsible for providing the tactical commander with timely and assured receipt of all-weather day and night intelligence of the battlefield gathered from national and tactical sensors. The Army TENCAP system architecture consists of various intelligence and electronic warfare communications and processing capabilities integrated to provide theater commanders and tactical units with assured access to national and selected theater systems. TENCAP also provides timely indications and warning, battle planning, and battle damage assessment information.

Intelligence System of Systems: A flexible and tailorable architecture of networks, procedures, organizations, and equipment focused on *the combat commander's needs* complements and reinforces the organic capabilities at each echelon. The term "system of systems" speaks of a complex systems architecture that, at each echelon, is analyzable into systems comprising complementary, fully integrated, recognizable systems deployed at lower echelons. When necessary, the "system of systems" provides direct support to commanders whose organic capabilities are not sufficient. The "system of systems" can provide comprehensive support from national to tactical level and is always engaged.

## IEW SOLE USER SYSTEMS

Sole user systems satisfy unique IEW requirements. A graphical depiction of an IEW sole user system, the TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT), is shown in figure 10-1. The TROJAN SPIRIT program was designed and developed by the intelligence community to provide the timeliness, capacity, and classification separation required for their communications that cannot be provided at this time by the Area Common User System (ACUS). A detailed systems description of TROJAN SPIRIT will be covered later in this chapter.

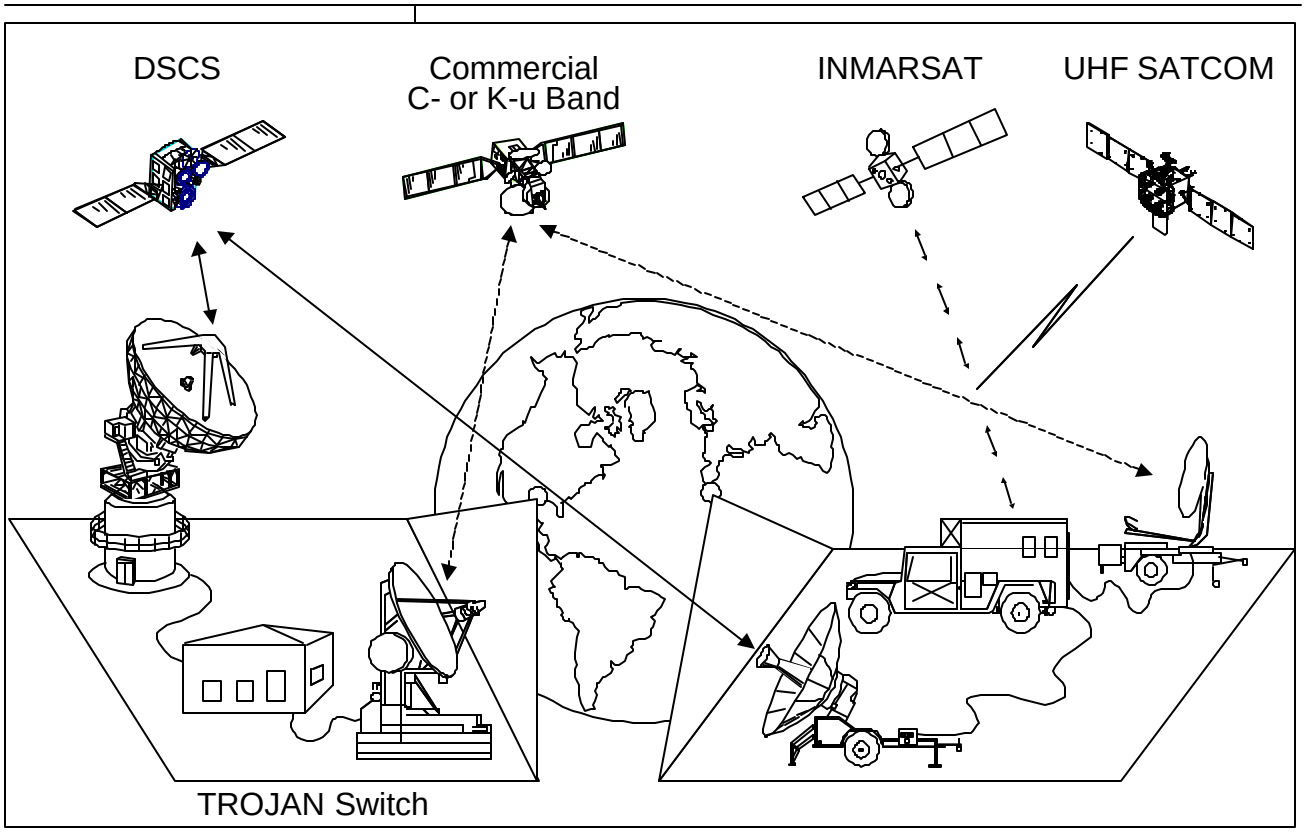


Figure 10-1. The TROJAN SPIRIT System was Designed and Developed by the Intelligence Community

Opinions differ about the categorization of TROJAN SPIRIT as a "sole user" system. Although the TROJAN SPIRIT user community is broader than the term "sole user" implies, TROJAN SPIRIT II is a dedicated-service system that supports intelligence dissemination at Division, Corps, and Echelons Above Corps (EAC) levels. The services of TROJAN SPIRIT II are not available to all functional users.

As shown, this intelligence dissemination system is supported by both commercial and, in EAC units, military satellite communications. The TROJAN sites generally use a medium data rate (4.8 kbps up to 1.544 Mbps) communications network to gain access to commercial SATCOM. At EAC, Defense Satellite Communications System (DSCS) terminals are used for range extension or reach-back to the Continental United States (CONUS).

TENCAP is linked to national systems via direct downlinks, DSCS, and/or commercial SATCOM. TENCAP dissemination is via the ACUS through terrestrial links and Ultra High Frequency (UHF) SATCOM broadcast using radios in various specialized terminals.

These dedicated service systems augment the ACUS by providing capabilities which neither Tri-Services Tactical Communications nor Mobile Subscriber Equipment can provide today, namely multi-level security (MLS) protection and additional bandwidth. There are ongoing efforts to incorporate these additional capabilities into the ACUS. Consolidation of communications into a single Warfighter Information

Network (WIN) must be accomplished where practical without degradation of service in order to maximize efficiency of satellite resources. The ACUS provides communications paths to the warfighter with redundancy and robustness in an environment independent of host nation communications assets. ACUS comprises common, interoperable equipment procured to meet the needs of the warfighter. Resource management is essential not only for cost control purposes but for interoperability and seamless connectivity within the global grid.

## THE MILITARY INTELLIGENCE MISSION

The MI focus is on support to military operations (figure 10-2). The MI echelons develop intelligence data that are focused on key threat battlefield operating systems. Strategic, operational, and tactical Army Intelligence forces and doctrine must evolve to support changing requirements and missions. Force projection requires a focus on mobilization, deployment, employment, total joint planning, and execution with other services. SATCOM support to the MI mission is found at all levels down to and including Brigade. SATCOM is an integral part of all products delivered within the MI mission. The information and specific data collected, analyzed, and fused by intelligence systems must be tailored within the "system of systems" to provide the following products:

• Command and Control: The commander must be provided the products which permit intelligence preparation of the battlefield. SATCOM-delivered space sensors information can reveal information about enemy capabilities and vulnerabilities and allow the senior intelligence officer to predict enemy courses of action. *Intelligence allows the warfighting commander to understand the battlefield.*

• Maneuver: As maneuver units penetrate the war zone, intelligence products must be delivered on the move in a timely manner for effective targeting, early warning, and situational development ahead of the line of march and adjacent to the Area of Responsibility (AOR).

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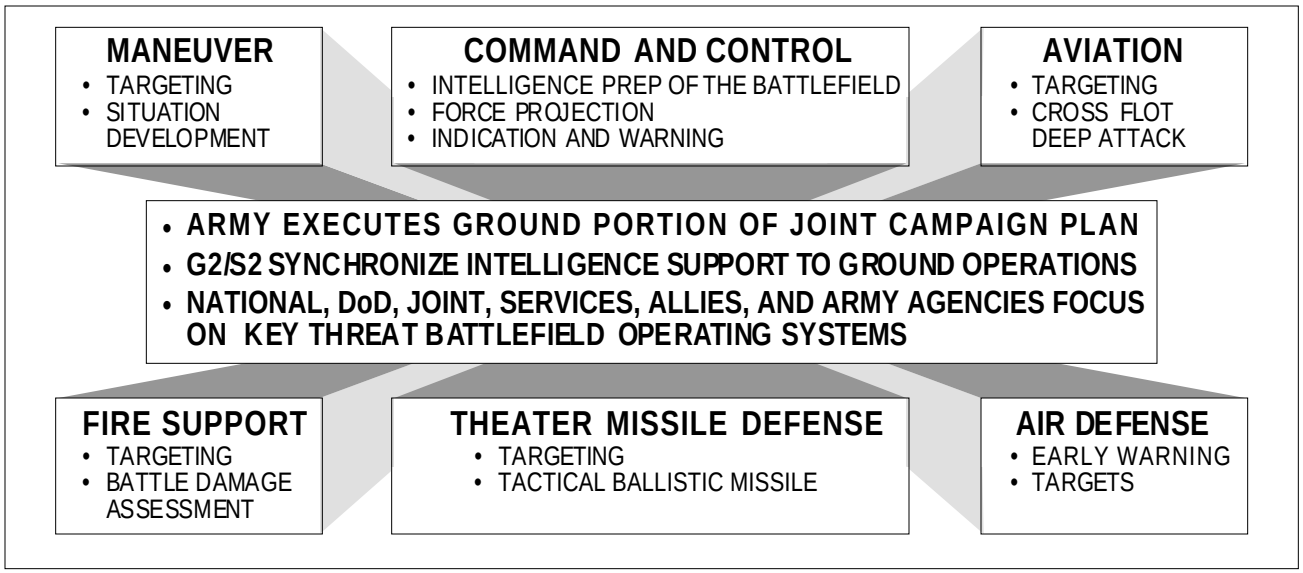


Figure 10-2. The Military Intelligence Focus is on Support to Military Operations

***Systems supporting the MI mission are always engaged and are in place to serve and support anywhere and anytime in the spectrum of conflict.***

• Aviation: Intelligence requirements for aviation are more demanding because they must be delivered while on the move to permit targeting over a larger AOR, to account for multiple targeting areas, and to span the forward line of own troops into the deep attack area.

• Fire Support: Information on targeting and battle damage assessment must be delivered to the warfighter in near real-time. The damage and impact made by fire support missions must be assessed, analyzed, and provided to the commander so he can ascertain the combat effectiveness, capabilities, and probable courses of action of the enemy. The need for visibility of the destruction of targets shapes the MI response to fire support demands.

• Air Defense: Early warning is a prime feature of MI support to air defense in order to prevent surprise to the force and to detect enemy actions that prove or run counter to planning assumptions, thereby helping to alleviate risk. Alert notice of attack aircraft penetrating into the AOR must be made immediately to the air defense units. Updates must be obtained and forwarded to the right people. Convergence of friendly force aircraft into the battle area is a complication which must be anticipated and met by MI support to air defense.

• Theater Missile Defense: Alerts from sensors located in a theater of operations provide only minutes of warning of the launch of tactical ballistic missiles such as Scuds. These alerts must then be relayed through the MI communications system to the Theater Missile Defense Battery responsible for countering incoming missiles. National products must bypass normal Army echelons to be available in near real-time to permit local systems to effectively predict first sightings. This will increase the probability of destruction of the incoming missile.

## MI CONNECTIVITY AND INTERFACES

Seamless connectivity is required. The functions listed above and their products require seamless connectivity of the MI echelons through the "system of systems." As previously described, this architecture's one overriding goal is *to support the warfighting commander*. Systems supporting the MI Mission are always engaged and are in place to serve and support anywhere and anytime in the spectrum of conflict.

MI systems support the needs of multiple commanders and multiple echelons. Echelonment is a central concept in the Army, unlike the Air Force which centralizes. The Army must be ready to deploy a mix of forces rapidly into a theater on short notice and, once in theater, units at all echelons must be in a state of readiness and capable of performing their missions over a wide range of military operations. This is especially true of MI units. MI must always be engaged across the operational continuum of peace, war, and restoration of peace (figure 10-3).

Each echelon has unique capabilities and different means available to assist the planning and execution needs of the commander at that echelon. The MI SATCOM communications architecture must focus on providing the capability to "push" intelligence products into the warfighting commander's hands as well as permit the commander to "pull" intelligence products that might assist in specific decision-making areas. Specific intelligence echelons and their missions are described below:

• National/Departmental/Strategic Level: This is the upper-most echelon focusing on producing finished intelligence products that support the National Command Authority. Information collected at this level is for the development and assessment of strategic planning of military operations.

• Army Theater MI/EAC: The focus of this echelon is to provide multi-disciplined intelligence and electronic warfare support to Joint Task Forces (JTF), overseas Army Service Component Commanders, and echelons corps and below forces that make up a forward presence. JTF operations place a premium on flexibility and interoperability. They also require that the links between EAC and echelons corps and below be concretely established in peacetime. Units and activities of the U.S. Army Intelligence and Security Command are the primary bridge between Army and Joint forces, and between echelons above and below corps. The Deployable Intelligence Support Element (DISE) is a small intelligence team that brings together communications, automated intelligence fusion, and broadcast downlinks in a small package capable of deploying with Army early entry forces. The DISE is not a specific organization or quantity of equipment but is a tactically tailored intelligence team that is uniquely configured based on the mission, threat, lift restrictions, and pre-positioned assets. The DISE is the core, initial-entry MI unit that is either expanded to a full Analysis and Control Element (ACE) as lodgment operations are completed, or is disbanded once the early-entry mission is complete. This flexible organization can be designed to support any type of ground force to include other Services or allied/ coalition forces. When deployed at the theater or JTF level, the DISE complements the National Intelligence Support Team which normally is in direct support of the JTF Headquarters. The Army's Joint Military Intelligence Support Elements, assigned today as the Army contribu-

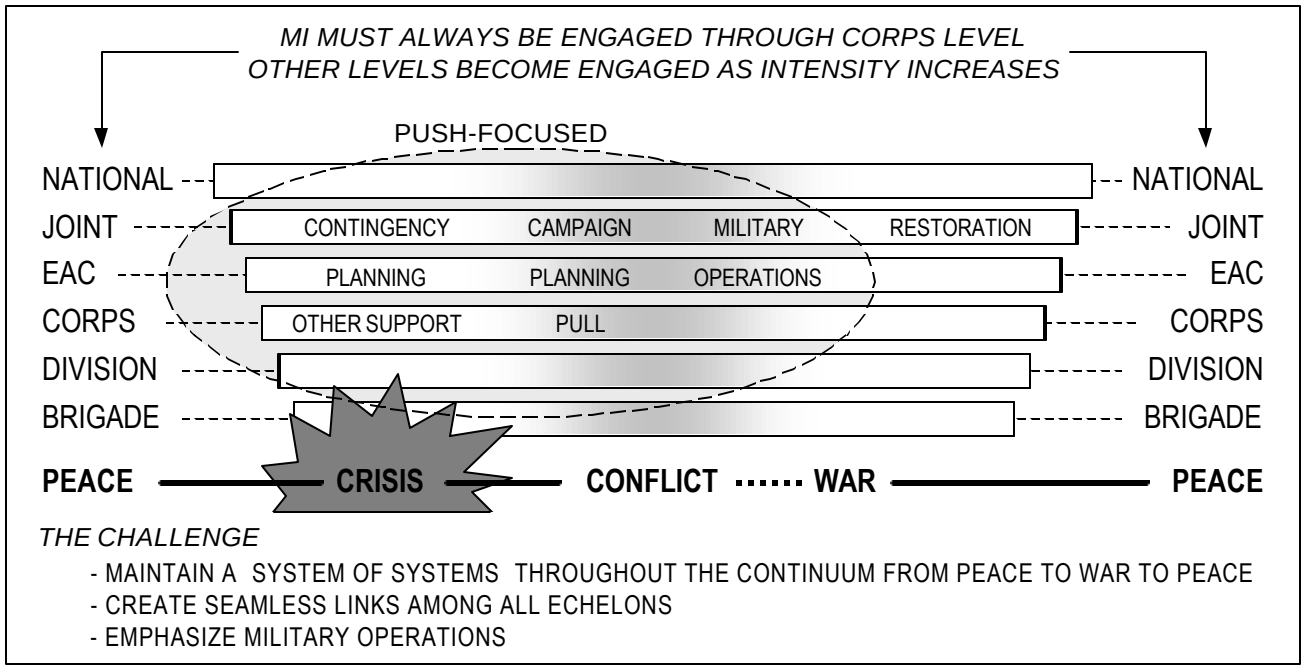


Figure 10-3. MI Echelons must be Seamlessly Connected to Support the Warfighting Commander

***From EAC down to and including maneuver brigades, the All Source Analysis System (ASAS) is the Army's single automated intelligence fusion tool.***

tion to the Theater Joint Intelligence Center (JIC), usually forms the core ground forces element of the JTF JIC. The Land Component Commander is supported by a Modernized Imagery Exploitation System (MIES), which in turn is supported by its own Tri-Band Satellite Subsystem. The EAC MI Force Projection brigades may also contribute ground forces expertise on a task-organized basis to the JTF JIC. The DISE interfaces with the JTF JIC to request intelligence information for the Army Forces Commander. Among the operational products are digital multi-spectral terrain products, imagery, secondary imagery, Integrated Broadcast Service (IBS) Signals Intelligence (SIGINT) data, Joint Surveillance and Target Attack Radar System (JSTARS) Synthetic Aperture Radar and Moving Target Indicator data, Electronic Intelligence data, and Communications Intelligence data.

• Corps MI: The Corps level ACE is the day-to-day working bridge between the corps and the supporting EAC MI brigade (figure 10-4). The ACE reinforces the organic analytical capability of the corps, and along with the Corps MI Brigade, directly supports the DISE. From EAC down to and including maneuver brigades, the All Source Analysis System (ASAS) is the Army's single automated intelligence fusion tool. ASAS hosts the Joint Deployable Intelligence Support System software and interoperates with the Joint Worldwide Intelligence Communications System (JWICS). This permits direct data exchange with other-service and national data bases (figure 10-5). ASAS is the centerpiece for intelligence processing, analysis, and reporting for the Army MI force supporting EAC down to maneuver brigades. The MIES also supports the Corps (i.e., V and XVIII Airborne Corps) ACE with national intelligence products. Products processed include digital multi-spectral terrain products, imagery, secondary imagery, IBS SIGINT , JSTARS SAR and MTI , ELINT, COMINT, and Unmanned Aerial Vehicle (UAV) data.

• Division MI: At Division level, which is the focal point for support of the Division G-2, the supporting Direct Support Military Intelligence Battalion serves as the Analysis and Control Element. The G-2 and the MI Battalion Commander tactically tailor their personnel and equipment between a division Main Command Post (CP), the Division Tactical CP, and a forward control team. Just as at Corps, the Division ASAS is the centerpiece for intelligence processing, analysis, and reporting. The Division Headquarters (HQ) is supported by a Common Ground Station, which is the link for receiving, filtering, and preprocessing broadcast intelligence feeds from such systems and networks as JSTARS, Combat Aviation, the IBS, and other IEW systems. The ACE is also supported by a Tactical Control Station (TCS) which receives data from the Division's organic tactical UAVs. Products processed are generally the same as those at Corps. The Mobile Integrated Tactical Terminal (MITT) supports the Division ACE with Electronic Order of Battle products, correlated intelligence products, and secondary imagery, and can exploit various forms of imagery products to include video camera and digital camera.

• Maneuver Brigade: At brigade level, which is the focal point for support of the Brigade S-2, the supporting Direct Support Military Intelligence Company serves as the Analysis and Control Team (ACT). The focus of the ACT, in conjunction with the Brigade S-2 section, is to provide near real-time enemy situation awareness and a horizontally shared, common relevant picture across the

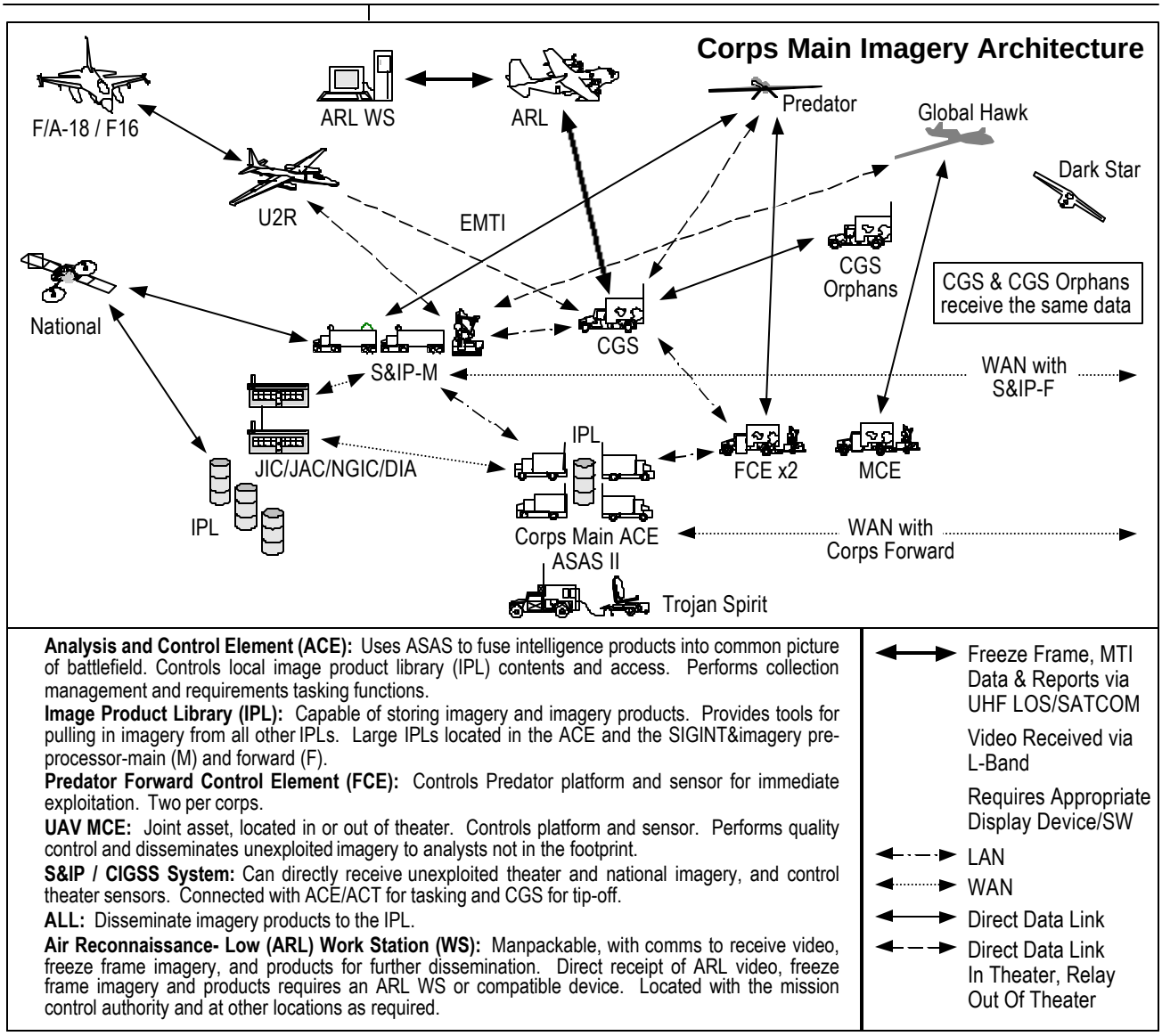


Figure 10-4. Corps Main Imagery Architecture uses a Variety of Platforms to Disseminate Critical Intelligence Information

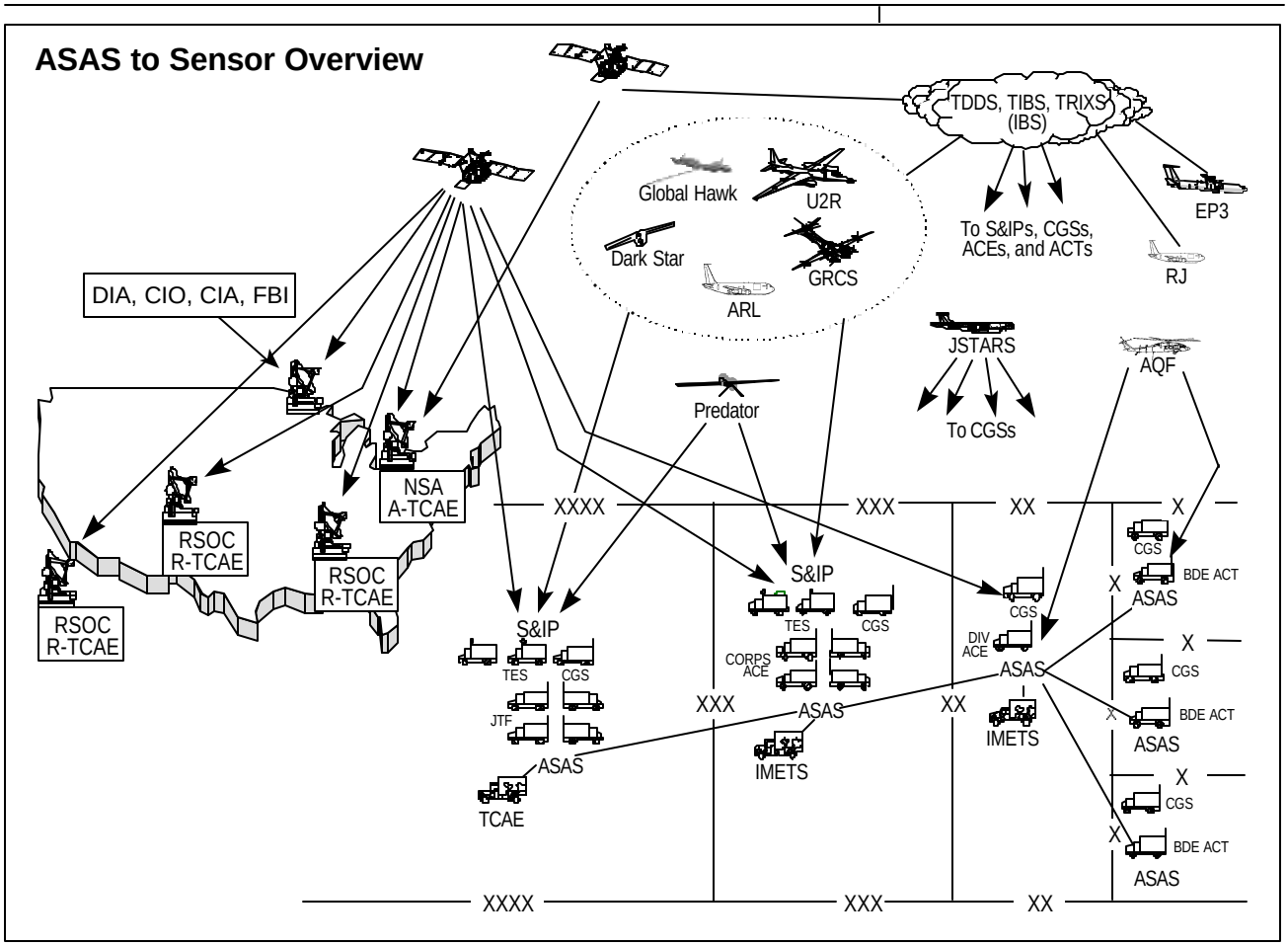


Figure 10-5. ASAS is the Centerpiece for Intelligence Processing, Analysis, and Reporting for Army MI

five components of the Army Battle Command System. Tethered to the Brigade Main Command Post, the ACT provides intelligence connectivity, processing, and fusion with ASAS Reconfigurable Work Stations, as well as the ability to maintain the intelligence database. The ACT is supported by a Common Ground Station, which is the link for receiving, filtering, and preprocessing broadcast intelligence feeds from such systems and networks as JSTARS, Combat Aviation, the IBS, and other IEW systems. The ACT is also supported by a TCS which receives data from the Brigade's organic tactical UAV.

Underpinning the entire concept of the "system of systems" is the need for flexible and reliable communications. Army MI cannot function without a communications architecture that can make the described interfaces in a seamless manner. Communications timeliness, security, throughput, connectivity, and redundancy must be improved in order to provide the required support. The architecture must permit MI units to receive and transmit imagery, bulk data bases, templates, and graphics. They must be able to conduct multi-based operations simultaneously, access worldwide Department of Defense (DoD) and theater databases, and provide direct dissemination of intelligence information through broadcast, point-to-point, and common user systems.

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## MI SATCOM TERMINALS

### Synthesized UHF Computer-Controlled Electronic Subsystem

***Designed for ground and mobile sheltered environments, SUCCESS communicates with terrestrial, airborne, and satellite systems.***

The Synthesized UHF Computer-Controlled Electronic Subsystem (SUCCESS) radio is a fully automated microprocessor-based, computer-controlled UHF band radio. SUCCESS handles data over one transmit and three receive channels simultaneously. With two rack-mounted SUCCESS units stacked, an integrated capability of two transmit and six receive channels is achieved.

Designed for ground and mobile sheltered environments, SUCCESS communicates with terrestrial, airborne, and satellite systems. The built-in Tactical Receive Equipment processor accepts up to three simultaneous Tactical Data Distribution System(TDDS) or Tactical Data Information Exchange System-B broadcasts and will transition to the IBS. In addition, with the incorporation of a Tactical Information Broadcast System (TIBS) Protocol Processing Unit, the SUCCESS is interoperable with a wide range of existing UHF radios and meets Joint Chiefs of Staff requirements for Fleet Satellite Communications System interoperability.

Developed for the U.S. Army and Air Force, SUCCESS is fielded in numerous tactical electronic systems such as the Tactical Exploitation System, Advanced Electronic Processing and Dissemination System (AEPDS), Enhanced Tactical Radar Correlator (ETRAC), and MIES/ Forward Area Support Terminal. SUCCESS provided the round-the-clock, critical communications performance needed during Operations Just Cause and Desert Storm.

The SUCCESS radio is Demand Assigned Multiple Access (DAMA) capable.

### Joint Tactical Terminal

***The Joint Tactical Terminal provides seamless, near real-time tactical intelligence and targeting information to the Joint Warfighter.***

The Joint Tactical Terminal (JTT) provides seamless, near real-time tactical intelligence and targeting information to the Joint Warfighter. The JTT allows all services to exploit legacy broadcasts (Tactical Reconnaissance Information Exchange System, TIBS, and TDDS) and migrate to the IBS.

The JTT is a UHF DAMA SATCOM based terminal with eight receive and one transmit channels and other configurations up to 12 receive and four transmit channels. The JTT can be used as a stand-alone terminal. As another user option, the JTT functionality can be obtained with Common Integrated Broadcast Service-Modules that can be integrated into another host platform, such as the emerging Joint Tactical Radio. JTT is used by all services and Special Operations Forces (SOF) and is being integrated into such systems as Guardrail Common Sensor, JSTARS, Patriot, AEGIS, Aircraft Carrier, and EA6-B. The JTT and CIBS-M, with warranty covering ten years, is replacing existing Commander Tactical Terminals in Air Defense Artillery, Field Artillery, Aviation, and MI units.

### Chariot

The Chariot is a tactical S-band SATCOM terminal designed to support the Army's tactical mission by receiving, processing, and disseminating intelligence data obtained from national sources. It is capable of receiving signals at data rates up to 1024 Kbps from Defense Meteorological Support Program and certain DoD low earth orbit satellites, and up

to 128 Kbps from certain geosynchronous earth orbit relay satellites. The Chariot is intended to support both the receipt and dissemination of nationally derived data through immediate access to sources and satellite relay capabilities. The Chariot is self contained and requires no tools for assembly or operation. Its reduced size and weight enhances deployment with the most mobile of ground maneuver forces currently supported by the Army TENCAP equipment.

## THE TROJAN EVOLUTION

The overall TROJAN program provides some very unique MI communications capabilities for the IEW community. The Classic TROJAN Program began in the 1980s. The purpose of this program is to provide a worldwide capability that enables MI analysts located in CONUS to remotely target and exploit global enemy operations in near real-time to enhance their linguist training and IEW readiness.

The worldwide Classic TROJAN system employs the following government or commercial satellite systems for transmission services:

- Government-owned systems: DSCS and NASA's Tracking and Data Relay Satellite System.

- Domestic commercial SATCOM systems: GE Americom (GSTAR) and Alaska Communications (ALASCOM).

- International commercial SATCOM system: International Telecommunications Satellite Organization (INTELSAT).

All Classic TROJAN requirements have been approved by the Commanders in Chief, validated by Joint Staff, and included in the Integrated Communications Data Base. The Classic TROJAN system has continued to perform well since its successful implementation. The MI and Signal communities have worked together, using existing off-the-shelf intelligence, communications, and space-based technologies to provide an effective global, seamless intelligence dissemination capability to support the Army warfighters.

***The purpose of the classic TROJAN program is to provide a worldwide capability that enables MI analysts located in CONUS to remotely target and exploit global enemy operations in near real-time to enhance their linguist training and IEW readiness.***

Operation Desert Shield and Desert Storm established an immediate need for an additional communications capability to support imagery and other intelligence dissemination, as well as for split-based intelligence exchange between forward deployed and garrison warfighter elements. Thirteen TROJAN SPIRIT systems were fabricated and quickly deployed to Saudi Arabia. Each consisted of a modified High Mobility Multipurpose Wheeled Vehicle (HMMWV)-mounted Classic TROJAN Switch Extension equipped with two personal computers, two secure digital phones, two facsimiles, two printers, and a SATCOM system capable of operating in the Super High Frequency (SHF) C-Band.

### TROJAN SPIRIT

The TROJAN SPIRIT proved highly effective in accomplishing its Gulf War missions. A high level view of the architecture is shown in figure 10-6. In mid-1992, HQ Department of the Army formally approved the expansion of the TROJAN SPIRIT program to satisfy urgent requirements to disseminate intelligence products, data bases, and imagery from the national and theater levels to tactical units. Although it is an interim dedicated-service system, the TROJAN SPIRIT program provides the unique capacity and MLS required

***Although it is an interim dedicated-service system, the TROJAN SPIRIT program provides the unique capacity and MLS required by the MI community.***

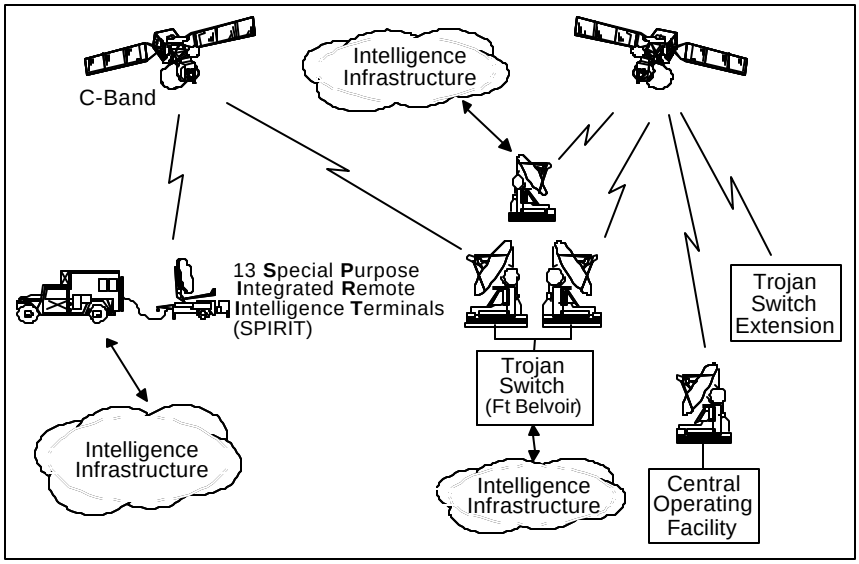


Figure 10-6. The TROJAN SPIRIT was Highly Effective in Accomplishing the MI Mission During Operation Desert Shield/Storm

***The original TROJAN mission has been greatly expanded since the late 1980s into a seamless, strategic-to-tactical IEW communications system that provides support to Army Commanders down to Division level.***

by the MI community. TROJAN SPIRIT's unique mobile ground terminal segment, space segment, and control segment are described in the following sections.

## TROJAN Ground Terminals

The original TROJAN mission has been greatly expanded since the late 1980s into a seamless, strategic-to-tactical IEW communications system that provides support to Army Commanders down to Division level. The TROJAN Network comprises 27 fixed-based TROJAN Classic Operating Facilities, 17 TROJAN Switching Extensions, the TROJAN Network Control Center, and 38 tactical TROJAN SPIRIT IIs. This entire architecture is the backbone for long-haul communications support for the IEW community within the IEW Battlefield Architectures as shown in figure 10-7.

The TROJAN SPIRIT II has three distinct tactical missions:

• To provide wide-area network access into the Classic TROJAN fixed communications network, as well as access to the Defense Information Systems Network's Secret Internet Protocol Router Network and the JWICS.

• To serve as the primary long-haul communications service provider for the tactical Analysis and Control Centers and their IEW products (imagery, data, and, video) that flow between Division, Corps, and EAC locations.

• To provide a communications backbone for IEW split-based operations and to support IEW reachback requirements.

The TROJAN SPIRIT II systems provide information dissemination support for the IEW and Surveillance community's requirements for voice, data, fax, UAV video and video teleconference services. These services support collaborative planning, secondary imagery, weather and terrain products, templates, graphics, and text capabilities at the Secret (collateral) and TS/SCI levels. The TROJAN SPIRIT II equipment is contained in two HMMWV-mounted shelters and can support up to 14

communications channels (eight SCI and six collateral) at data rates ranging from 4.8 kbps to 512 kbps. The TROJAN SPIRIT II systems use commercial satellite links to support forces in split-based operations at rates up to T-1 (1.544Mbps). The system now utilizes C and Ku- band commercial satellite systems such as INTELSAT, GSTAR and Pan American Satellite Organization. In support of Joint Task Force operations, EAC MI Battalions are scheduled to receive the new X-Band 6.1-meter antenna for DSCS operations once certification and operator training are complete.

These TROJAN SPIRIT II systems have been used extensively for Task Force XXI and the First Digitized Division exercises. TROJAN SPIRIT IIs in the 4th Infantry Division have supported IEW information dissemination as well as the Global Broadcast Service (Battlefield Awareness Data Dissemination) experiments during the Brigade Advanced Warfighter Experiment. TROJAN SPIRIT IIs are accredited for simultaneous multi-level security operations at both the Secret (collateral) and TS/SCI levels. In addition, TROJAN SPIRIT IIs provide Secret (collateral) and TS/SCI

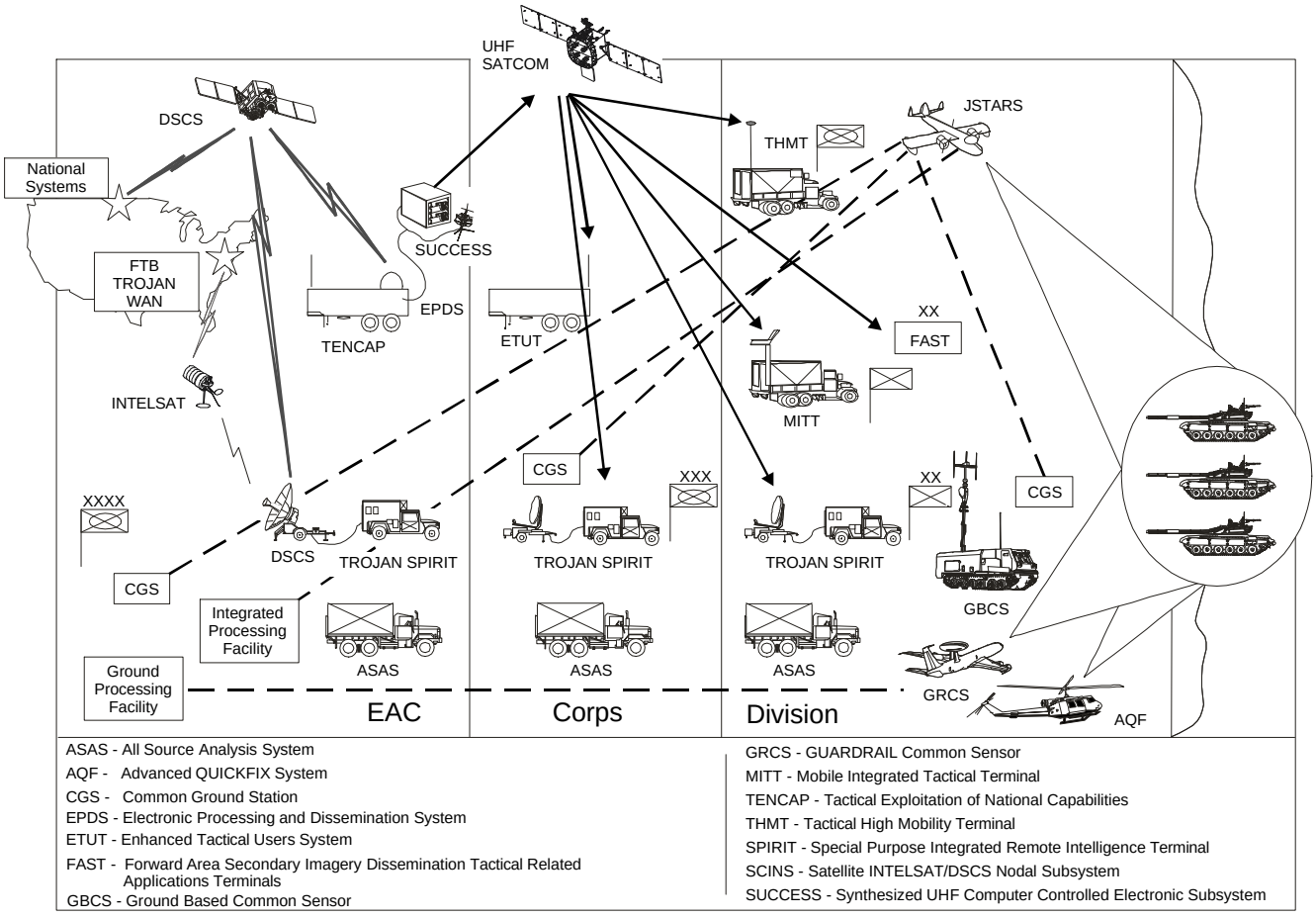


Figure 10-7. TROJAN SPIRIT is Embedded in the IEW Battlefield Architecture

voice and data exchange between two or more TROJAN Digital Voice Instrument (TDVI). The TDVI provides dial-up digitized voice, facsimile, and data exchange between TROJAN facilities.

While the TROJAN SPIRIT II is a superb system, it does have some limitations (figure 10-8). Some of the terminal components which make up the TROJAN SPIRIT II limit communications functionality and cause inefficiencies of satellite bandwidth. The table below highlights these shortcomings.

As long as the TROJAN SPIRIT II is required to support IEW operations, the IEW community will continue to be involved in the communications business and will be forced to use valuable resources for this mission. The current goals of the MI Corps for TROJAN SPIRIT II are threefold:

• Ensure that all TROJAN SPIRIT II systems are recapitalized to protect and sustain their capabilities while the components of the WIN (e.g., WIN-Terrestrial switchboards, High Capacity Line of Sight radios, STAR-T, and SMART-T) evolve.

• Ensure that any recapitalization of TROJAN SPIRIT II communications equipment is coordinated with the Signal Community to ensure WIN fielding timelines are accurate and recapitalization investments are validated.

• Turn over the communications functionality of TROJAN SPIRIT II to the Signal Regiment and the WIN as soon as WIN proves the ability to meet all IEW needlines, information exchange requirements, and speed of service requirements published in the TROJAN SPIRIT to WIN Migration Plan, Volume I (dated 21 Oct 98) and Volume II (draft).

As these terminals' service life is extended well past their original FY 2002 plan, the U.S. Army Military Intelligence Center Commanders agree that their continued service life

**TROJAN EQUIPMENT LIMITATIONS**

| | |
|---|---|
| **Satellite Modem EF Data 650B** | 1. Limited available forward error correction schemes (no Reed-Solomon)<br>2. Low input signal sensitivity<br>3. Old equipment nearing end of supportable life cycle |
| **KIV-7HS** | 1. Does not support data rates identified in the ORD<br>2. Not compatible with STEP site crypto |
| **DP-2048 MUX** | 1. Manually configured to allocate bandwidth (all ports are fixed rate, full period, voice and Ethernet)<br>2. Limited by fixed range of data port/aggregate rates<br>3. Does not support data rates identified in the ORD |
| **TDVI Phones** | 1. Synchronous serial data interface<br>2. Proprietary, not compatible with WIN |

Figure 10-8. TROJAN Equipment Limitations

is a critical part of the Division, Corps, and EAC communications architecture and services as a capable "bridge" between ACUS and WIN. As directed by HQ, TRADOC, a TROJAN SPIRIT to WIN Migration has been developed and serves as the basis for the transition of all the functional requirements of TROJAN SPIRIT over to the Signal Regiment. This Migration Plan, dated 21 October 1998, was signed by the Commanding Generals of the U.S. Army Signal Center and the U.S. Army Intelligence Center. It was approved by HQ TRADOC on 21 November 1998 and sent to HQDA for funding support. Funding approved in March 2000 for Recapitalization of the 38 TROJAN SPIRIT IIs and the TROJAN Network Control center extends the service life of TROJAN SPIRIT IIs to approximately FY2005. The Signal Center continues to oversee migration efforts to ensure that adequate throughput (bandwidth) and security features are provided to ensure that this migration can be accomplished beginning in FY2005. The migration will take approximately seven years to complete. In other words, some TROJAN SPIRIT IIs will remain in the field until approximately FY2012.

## TROJAN Air Transportable Electronic Reconnaissance System

The TROJAN Air Transportable Electronic Reconnaissance System (TATERS) is a transportable ground terminal for the TROJAN system. TATERS is less mobile once placed in its intended configuration, being a multiple semi-trailer, modular system with 8- and 20-foot satellite dishes. Implementing the full range of TROJAN collection capabilities in this transportable configuration, TATERS supports the Army's contingency missions by providing worldwide, forward-deployed, quick reaction capabilities. The TATERS nominal site configuration, including TROJAN Satellite INTELSAT/DSCS Nodal Subsystem (SCINS) for communications, is shown in figure 10-9. TATERS is reconfigured and staged at depot prior to each operational deployment to mount only those assemblies required for the specific contingency mission. Transport is usually provided on C-130 or larger aircraft.

***Implementing the full range of TROJAN collection capabilities in this transportable configuration, TATERS supports the Army's contingency missions by providing worldwide, forward-deployed, quick reaction capabilities.***

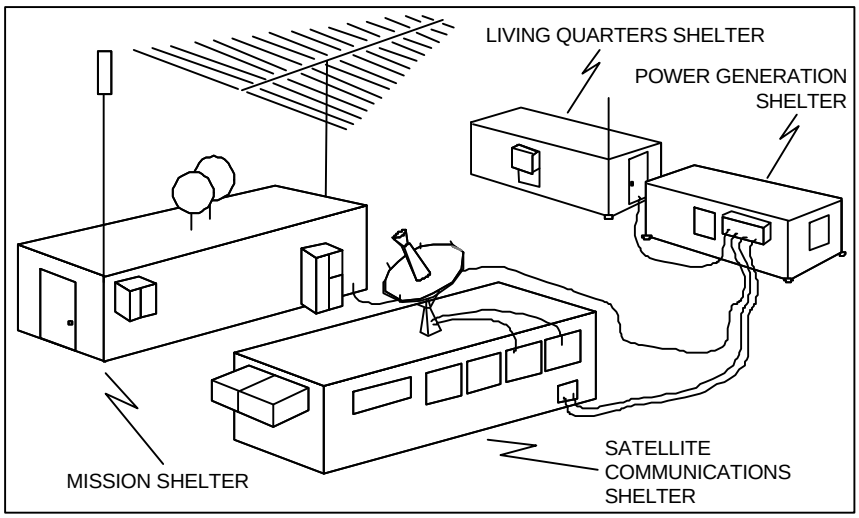


Figure 10-9. Typical TROJAN Air Transportable Reconnaissance System (TATERS) Deployment

SCINS, a sub-system of TATERS, which integrates the TROJAN communications suite, provides the SATCOM for the system. Access is primarily through commercial SATCOM (INTELSAT, etc.), but capability to access DSCS is available. The SCINS provides a fully redundant SHF (C-/X-/Ku- band) SATCOM capability and is intended to operate with a 20-foot satellite dish.

### TROJAN Switching Systems

#### TROJAN Switching System at Fort Belvoir

***All TROJAN subscribers, including tactical elements, must connect through the single switching node at Fort Belvoir, VA.***

This Fort Belvoir site provides the central switching facility for all TROJAN communications which link this worldwide system of fixed and mobile intelligence assets. Under the current TROJAN network architecture, all TROJAN subscribers, including tactical elements, must connect through the single switching node at Fort Belvoir, VA.

#### TROJAN Transportable Mini-Switch System

The TROJAN Transportable Mini-Switch System (TTMS) is a self-contained, transportable TROJAN switch that is interoperable with the existing TROJAN network. TTMS was developed in order to reduce the transoceanic communications load on the Fort Belvoir TROJAN switch by handling all the intra-theater switching and to reduce the possibility of a single point of failure at the Fort Belvoir switch. TTMS will eliminate the need for dual satellite hops and cut satellite access costs. The TTMS can be installed within the communications satellite footprint serving a contingency area of operations to provide a limited TROJAN switching capability in support of tactical force projection Army operations. A TTMS provides switching support for up to 12 TROJAN SPIRIT II terminals or TROJAN Switch Extensions. The use of TTMS can result in higher degrees of network redundancy, alternative routing, and flexibility, and provide a significantly improved capability for tactically deployed forces to obtain critical intelligence data across the TROJAN architecture.

## INTELLIGENCE AND ELECTRONIC WARFARE SATCOM ARCHITECTURE

Military intelligence is an ever-present factor throughout the political and military spectrum. The Army IEW and Reconnaissance, Surveillance, and Target Acquisition (RSTA) systems are tasked to provide focused, timely intelligence at each echelon, and satisfy multiple intelligence consumers. SATCOM is a vital part of all such systems. The IEW/RSTA architecture can be roughly divided into the following three areas:

- SIGINT and Electronic Warfare Processing and Dissemination.
- Imagery Intelligence (IMINT) Processing and Dissemination.
- Human Intelligence (HUMINT) and Counter Intelligence (CI) Processing and Dissemination.

### Signals Intelligence Architecture

SIGINT acquires (detects) and exploits critical enemy command, control, reconnaissance, and surveillance nodes and can contribute directly to all intelligence functions (figure 10-10). Tactical SIGINT operations concentrate on precisely finding high payoff targets and contributing targeting information. That information can quickly and accurately be relayed via SATCOM.

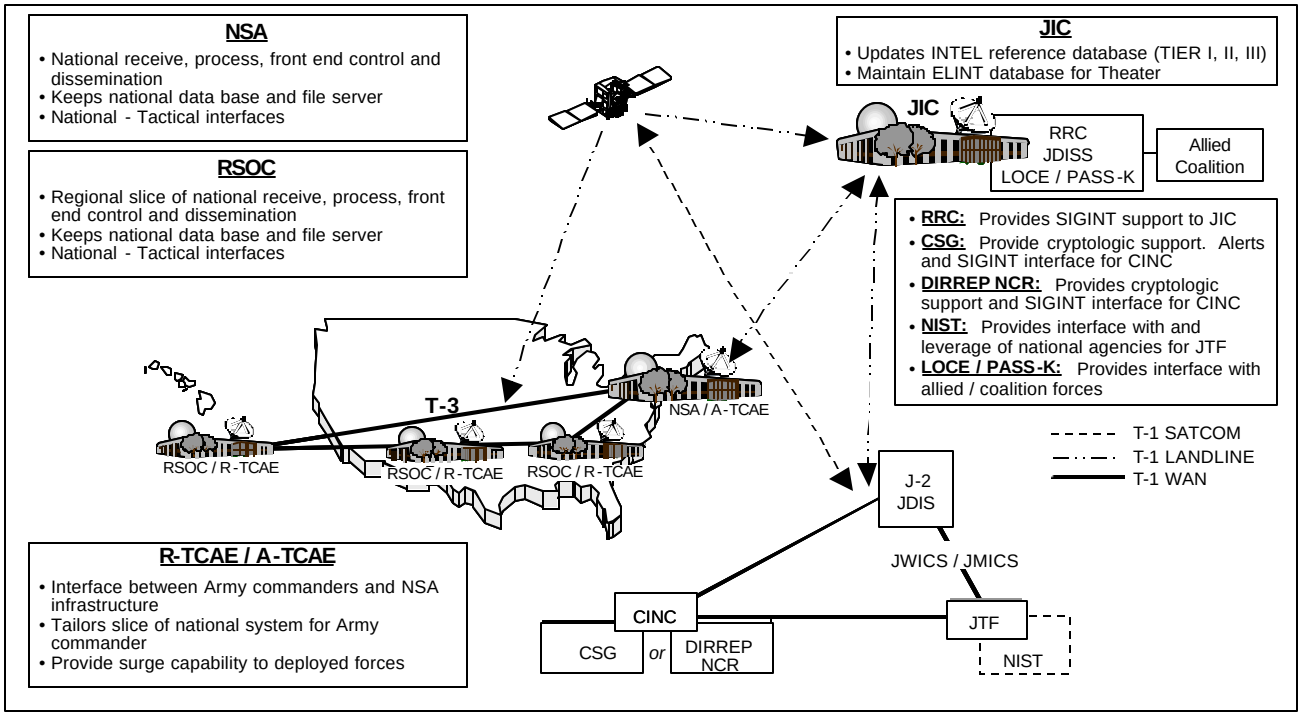


Figure 10-10. National Level SIGINT Products are Disseminated to the Theater. MLS Must Be Present on all Links

This architecture is characterized by dissemination of national-level products down to the theater of operations via military SATCOM, commercial SATCOM, and direct downlinks to TENCAP systems. The SUCCESS radio, the TROJAN communications system, the Chariot radio, and the ACUS provide for secondary distribution of intelligence products over the battlefield. Figure 10-11 shows a graphic interpretation of this architecture which is further characterized by the need for MLS on all communications links. The SIGINT network must allow producers and users of intelligence products to interface at all security classification levels.

When the ACUS matures to its objective configuration, it will be the primary communications link for support of the Analysis and Control Elements within each echelon of a mature theater and will be especially important to intra-theater communications. Combat Net Radio links the warfighters and the IEW community via UHF SATCOM and Single Channel Ground Air Radio System radio.

The TENCAP and TROJAN SPIRIT systems provide valuable connectivity for early-entry operations, joint operations, peacekeeping operations, humanitarian assistance, and operations in the aid of civil authorities when a mature theater is not yet deployed. In theater, IEW products are disseminated from ground processing facilities via ACUS and UHF SATCOM links, and via TROJAN SPIRIT until WIN can assume this mission. TROJAN SPIRIT currently is the workhorse for support of the ACE at Division and Corps, and of the DISE at EAC.

The TENCAP systems use DSCS, UHF SATCOM, and direct downlinks as the means for receiving SIGINT products from national sources. Intelligence producers within CONUS and in the theater of operations insert

intelligence products into broadcast receivers, such as the SUCCESS radio, to support the warfighting commanders at all echelons. Divisions are supported via the MITT and the FAST. At Corps and above, support is provided by the AEPDS.

### Imagery Intelligence Architecture

IMINT allows the commander to "walk" the battlefield. By extending the commander's line of sight, IMINT helps provide the commander final validation that his concept of the battlefield is accurate and complete. IMINT products also support mission analysis, planning, and rehearsals when correlated with other intelligence products.

IMINT is used to acquire and exploit visual representations that contribute to indications and warning, targeting, situational development, battle damage assessment, and Intelligence Preparation of the Battlefield. It allows the commander to see how the enemy is presenting his forces. IMINT has progressed far beyond simple photography. Images are received, analyzed, and processed from ground and aerial sensors, manned and unmanned, commercial, and government sources.

The IMINT architecture is characterized by the dissemination of national-level products via DSCS and commercial SATCOM downlinks to the processing facilities and the ACUS.

***By extending the commander's line of sight, IMINT helps provide the commander final validation that his concept of the battlefield is accurate and complete.***

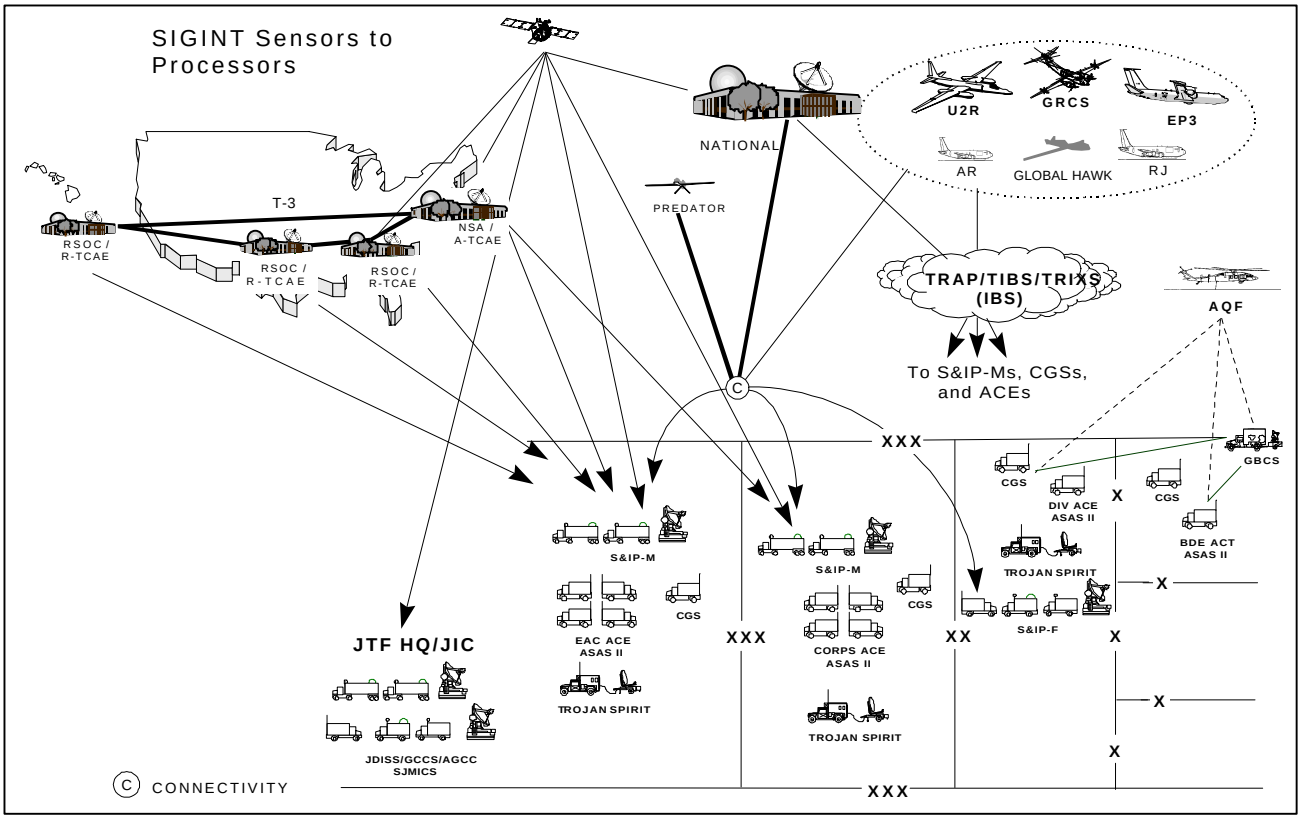


Figure 10-11. In Theater, SIGENT Products are Disseminated from Ground Processing Facilities via ACUS, UAV, and UHF SATCOM Links

While there is a need at higher echelons in the theater of operations for multi-level secured communications, the bulk of the traffic is collateral secondary imagery products.

IMINT is introduced into the theater via national sources or in-theater producers. In-theater producers include such systems as JSTARS aircraft, UAVs, and the U-2 aircraft. These systems feed into ground stations and, after that, intelligence dissemination is accomplished by multiple means. In a mature theater, the primary dissemination means is the ACUS. IEW-specific systems such as TENCAP and TROJAN SPIRIT provide valuable connectivity for early entry operations, joint operations, peacekeeping operations, humanitarian assistance, and operations in the aid of civil authorities when a mature communications theater is not yet developed.

The TROJAN SPIRIT terminal provides a unique flexibility in that it can reach back to CONUS in a split-based scenario via high capacity SHF SATCOM and disseminate IMINT products within the battlefield via UHF SATCOM and ACUS links to the maneuver brigades.

MIES is the workhorse for support of IMINT and is normally deployed with Corps and EAC. Each MIES is supported by its own Tri-Band SATCOM Subsystem (TSS). TSS, which is part of the TENCAP family of systems, is a follow-on to the specialized, transportable, high data rate, X-band SATCOM terminal that is used for the receipt of raw IMINT and dissemination of IMINT and secondary imagery products to users. The MIES communications support segment provides flexible, scalable support to the theater intelligence element and is capable of doing so via Military Satellite Communications (MILSATCOM) and commercial SATCOM. Dissemination of MIES products is accomplished via UHF broadcast, the ACUS, and the TROJAN SPIRIT.

The ETRAC is the Army's ground processor for the U-2 Advanced Synthetic Aperture Radar System aircraft providing Army field commanders with accurate, reliable, and timely imagery-based battlefield intelligence. The ETRAC's communications provides flexible, scalable support to the Corps/theater intelligence elements and is capable of doing so via MILSATCOM and commercial SATCOM. Dissemination of ETRAC products is accomplished via UHF broadcast, the ACUS, injection into the TIBS broadcast network, and the TROJAN SPIRIT.

The JSTARS and UAV systems produce and inject IMINT at all in-theater echelons. Ground stations have the same dissemination alternatives as MIES. The JSTARS Common Ground Station will use UHF SATCOM to relay JSTARS imagery to other Common Ground Stations that are not in the line-of-sight footprint of the JSTARS aircraft or that are on-the-move preventing use of their direct downlink from JSTARS aircraft. JSTARS and UAV ground stations are deployed down to the maneuver brigade level (figure 10-12). The TENCAP systems receive national-level products and disseminate imagery via direct ACUS connectivity or by broadcast over the battlefield via the SUCCESS or Chariot radio. The SUCCESS radio provides the major mechanism for broadcasting imagery directly to the TENCAP systems (such as MITT and the FAST) serving the warfighter.

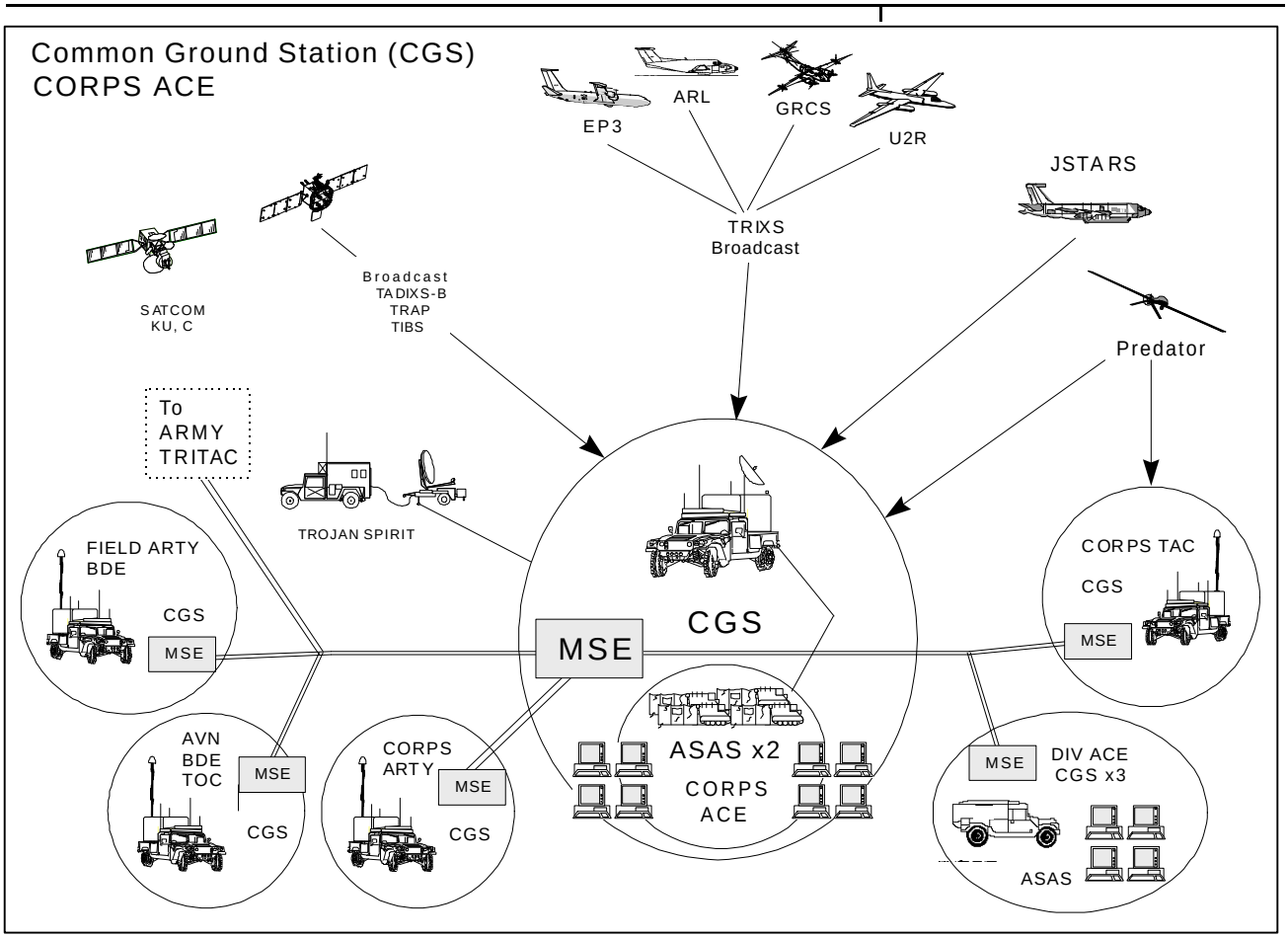


Figure 10-12. The Common Ground Station is the link for Receiving, Filtering, and Pre-processing Broadcast Intelligence Feeds from a Variety of IEW Systems

### Human Intelligence SATCOM Architecture

HUMINT has particular value in its ability to add detail and rationale to that intelligence gained through more technical means. When properly employed, HUMINT can provide significant contributions. HUMINT operates throughout all echelons across the continuum of military operations.

Ground-based and airborne tactical reconnaissance, surveillance, and verification support Army forces through maneuver battalion operations. These assets are particularly valuable to the commander when he needs “eyes on target” at critical points in the operation. Intelligence officers play key roles in the success of those gathering HUMINT (i.e., Long Range Surveillance Units (LRSU), SOF, cavalry troops, counter intelligence/interrogation teams, and scout missions) by providing training, pre-mission briefs, and post mission debriefs. All such missions require reliable, long-range, secure communications.

HUMINT SATCOM architecture is characterized by dissemination of theater HUMINT via DSCS, UHF SATCOM, and the ACUS. Figure 10-13 shows a graphical interpretation of this architecture. HUMINT products are generated at all levels from beyond the forward edge of the battle

***HUMINT has particular value in its ability to add detail and rationale to that intelligence gained through more technical means.***

area (FEBA) back to CONUS by those HUMINT-gathering units and teams listed in the preceding paragraph. The primary means of communications for the CI and Interrogation Teams is via Combat Net Radio and the ACUS. When those means are not available or practical, single channel UHF SATCOM becomes the primary means for command and control as well as dissemination of information. When these teams are in dispersed areas to conduct peace operations, humanitarian assistance, and operations in aid of civil authorities, they require the use of MILSATCOM for mission accomplishment.

LRSU normally operate well forward of the FEBA, which is beyond ACUS connectivity. Additionally, LRSU missions require a high degree of stealth and secure, protected communications with low probability of intercept and detection (LPI/LPD). While UHF SATCOM does not fulfill all of the LRSU mission requirements, the teams will use UHF single channel SATCOM for voice and data burst service for reporting and command/control. The LRSU communications will migrate to Milstar communications when the Single Channel Anti-Jam Manportable (SCAMP) terminals are fielded. Milstar will provide the high level of covertness and greater LPI/LPD that is required.

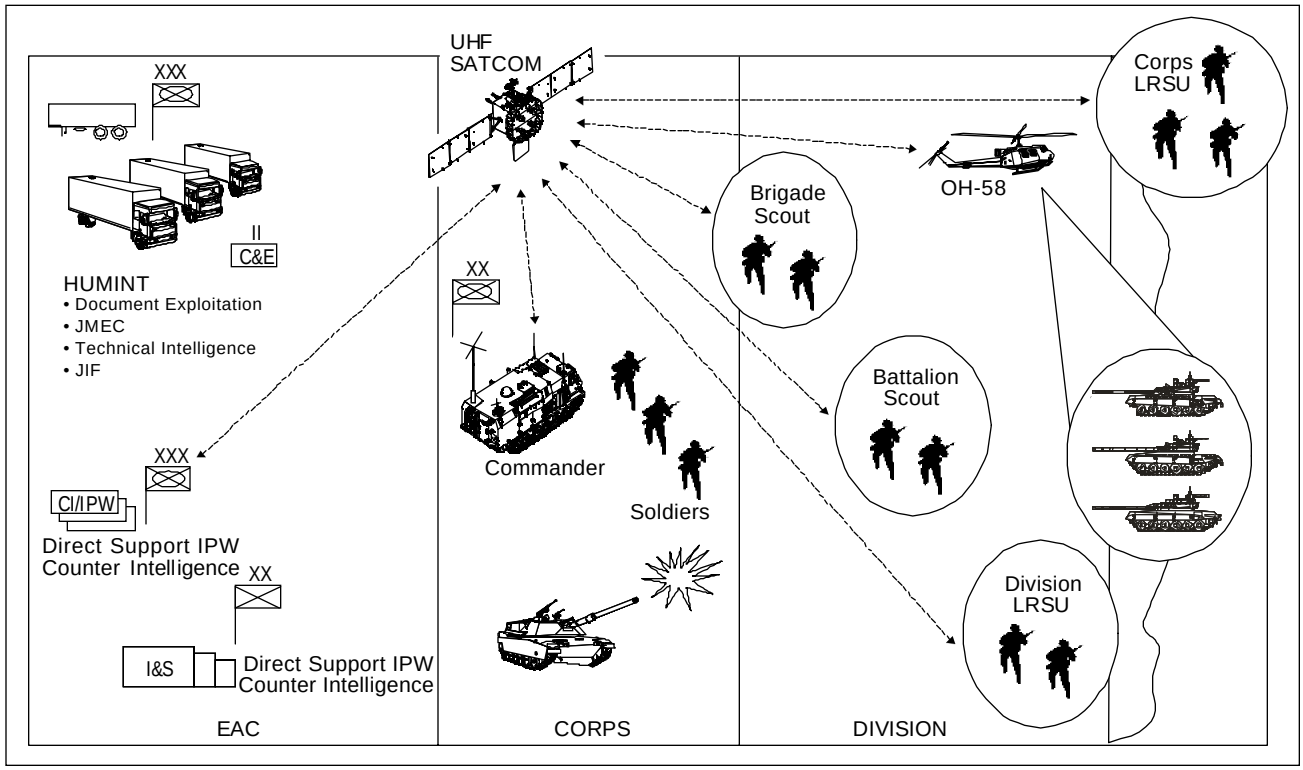


Figure 10-13. HUMINT SATCOM Architecture Relies on UHF for C2 and Information Dissemination

## SUMMARY

Intelligence is the key to the warfighting commander's understanding of the battlefield. Today's military intelligence mission is to provide timely, accurate, and relevant intelligence and electronic warfare support to tactical, operational, and strategic commanders across the continuum of military operations. The IEW architectures support a variety of missions using both military and commercial SATCOM. Some intelligence missions cannot be supported with area common user systems because of capacity and security limitations. This has led the MI community to develop SATCOM systems designed to provide the timeliness, capacity, and security separation required for their unique missions.

The TROJAN program is a dedicated communications system that supports intelligence dissemination. TROJAN is not a common user system. The TROJAN system employs both commercial and military satellite communications systems. There are many components of the TROJAN system including switching systems and ground terminals. The TROJAN SPIRIT is a mobile terminal designed primarily as a near-term solution for MI-unique communications requirements at EAC and ECB. TROJAN SPIRIT performed exceptionally well in Desert Storm.

The intelligence "system of systems" concept is a flexible architecture of networks, procedures, organizations, and equipment focused on the commander's needs. It provides comprehensive support at all echelons and is always engaged.

There are three areas of the IEW architecture that provide focused intelligence products to the commander: SIGINT, HUMINT, and IMINT. SATCOM is vital to each area.

The MI SATCOM architecture must permit intelligence units to receive and transmit imagery, bulk data bases, templates, and graphics. MI SATCOM systems enable direct dissemination of intelligence information through broadcast, point-to-point, and common user systems.

A force projection Army demands reliable, multi-echeloned intelligence support. Clearly, the intelligence effort cannot be achieved without satellite communications. The Army must continue to leverage technology and work towards obtaining long range communications systems that will meet the requirements of the intelligence community. SATCOM is a vital part of the IEW communications architecture at every echelon.

***Today's military intelligence mission is to provide timely, accurate, and relevant intelligence and electronic warfare support to tactical, operational, and strategic commanders across the continuum of military operations.***

**ACE**
Analysis and Control Element

**ACT**
Analysis and Control Team

**ACUS**
Area Common User System

**AEPDS**
Advanced Electronic Processing and Dissemination System

**AOR**
Area of Responsibility

**ASAS**
All Source Analysis System

**CI**
Counter Intelligence

**CONUS**
Continental United States

**CP**
Command Post

**DAMA**
Demand Assigned Multiple Access

**DISE**
Deployable Intelligence Support Element

**DOD**
Department of Defense

**DSCS**
Defense Satellite Communications System

**EAC**
Echelons Above Corps

**ETRAC**
Enhanced Tactical Radio Correlation

**FAST**
Forward Area Support Terminal

**FEBA**
Forward Edge of the Battle Area

**HMMWV**
High Mobility Multi-Wheeled Vehicle

**HQDA**
Headquarters Department of the Army

**HUMINT**
Human Intelligence

**IBS**
Integrated Broadcast Service

**IEW**
Intelligence and Electronic Warfare

**IMINT**
Imagery Intelligence

**INTELSAT**
International Telecommunications Satellite Organization

**JIC**
Joint Intelligence Center

**JSTARS**
Joint Surveillance and Target Attack Radar System

**JTF**
Joint Task Force

**JTT**
Joint Tactical Terminal

**JWICS**
Joint Worldwide Intelligence Communications System

**LPI/LPD**
Low Probability of Interception/Low Probability of Detection

**LRSU**
Long Range Surveillance Units

**MI**
Military Intelligence

**MIES**
Modernized Imagery Exploitation System

**MILSATCOM**
Military Satellite Communications

**MITT**
Mobile Integrated Tactical Terminal

**MLS**
Multi-Level Security

**RSTA**
Reconnaissance, Surveillance, and Target Acquisition

**SATCOM**
Satellite Communications

**SCAMP**
Single Channel Anti-jam ManPortable Terminal

**SCINS**
TROJAN Satellite INTELSAT/ DSCS Nodal Subsystem

**SHF**
Super High Frequency

**SIGINT**
Signals Intelligence

**SMART-T**
Secure, Mobile, Anti-jam, Reliable, Tactical Terminal

**SOF**
Special Operations Forces

**STAR-T**
SHF Tri-Band Advanced Range Extension Tactical Terminal

**SUCCESS**
Synthesized UHF Computer-Controlled Electronic Subsystem

**TATERS**
TROJAN Air Transportable Electronic Reconnaissance System

**TCS**
Tactical Control System

**TDDS**
Tactical Data Distribution System

**TDVI**
TROJAN Digital Voice Instrument

**TENCAP**
Tactical Exploitation of National Capabilities

**TIBS**
Tactical Information Broadcast System

**TROJAN SPIRIT**
TROJAN Special Purpose Integrated Remote Intelligence Terminal

**TSS**
Tri-Band SATCOM Subsystem

**TTMS**
TROJAN Transportable Mini-Switch System

**UAV**
Unmanned Aerial Vehicle

**UHF**
Ultra High Frequency

**WIN**
Warfighter Information Network